CALFED Interagency Fish Facilities Technical Team

June 16, 1998, 8:00 am to 5:00 pm

Meeting Minutes

Present:

Dan Odenweller, DFG (Chair)
Darryl Hayes, DWR
Paul Raquel, DFG
George Heise, DFG
Charles Liston, USBR
Ron Brockman, USBR
Michael Lee, USBR
Sergio Guillen, CALFED
Nichele Ng, DWR
Steve Roberts, DWR
Dave Samson, CALFED
Mike Ford, DWR
Jim Spence, DWR
Steve Ford, DWR
Shawn Mayr, DWR
Ted Frink, DWR
Marcin Whitman, DFG
Ned Taft, Consultant
Ken Bates, Consultant
Dennis Dorratcague, Consultant
Rick Wantuck, NMFS
Kevan Urquhart, DFG
Jane Arnold, DFG
David Fullerton, CALFED
Bruce Herbold, EPA
Mike Fris, USFWS
Jeanne Schallberger, DWR
Ron Ott, CALFED

The meeting was convened at the request of CALFED management for the general purpose of providing recommends on how to stage fish facilities (next 7 to 10 Years) in the south and north Delta and to minimize the risk in doing so. The general questions to be addressed and the comments on the draft minutes of the meeting are included in the attached Appendices A and B respectively.

The following recommendations and considerations were made by the Team.

South Delta

Recommendations:

If the CALFED decision is to maintain two diversions in the south Delta (Tracy and north end of CCF), the follow staging is recommended.

1) Construct by the year 2,500 a research screening facility at Tracy that can eventually become a production facility. The facility would consist of a 1,500 to 3,000 cfs module "V" type screen that could be replicated in the south Delta. Use this facility to conduct research on components and programs that would lead more efficient designs in the south Delta (such as trash racks, screening velocities, bypasses, screen material and orientation, fish handling and sorting, debris management, cleaning, transportation, etc.)

2)Start the planning, permitting and design process for a 5,000 to 7,000 cfs screening

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production screening facility (with capability for research and modification) at north end of CCF. It is anticipated that construction would not start for two to three years and the design would consider the research information from the facility at Tracy. Both facilities would be designed for 0.2 fps approach velocity with capability to increase to 0.4 fps at certain periods.

3)Start the planning and the design of the SWP/CVP intertie.

If the CALFED decision is to construct a joint SWP/CVP screening facility at the north end of CCF, the follow staging is recommended.

1)Start the planning, permitting and design process for a first stage 5,000 to 7,000 cfs joint SWP/CVP screening research and production screening facility at north end of CCF. Design the facility in modules for research and production, with capability to be expanded to 15,000 cfs in the future. It is anticipated that the initial stage would be completed in two to three years. Design for a 0.2 fps approach velocity with capability to increase to 0.4 fps at certain periods.

2)Start the planning and the design of the SWP/CVP intertie.

Considerations:

1)Advantages of Separate and Joint Facilities (at build out)

Separate Facilities

- Flexibility (may have biological and water quality advantage especially without barriers)
- Redundancy of system
- USBR has been mandated to fix their screens
- USBR can start immediately and may have constructed by 2000

Joint Salvage Facility

- Economies of scale
  - -Capital cost
  - -Operations cost
- One joint salvage and research facility
- Research done at one joint facility - better coordination, transferability, and no duplication of effort
- Little or no potential stranded cost (capital and O&M)

2)Need modeling studies to determine impacts on water stages of pumping 10,000 to 15,000 cfs continuously even with barriers.

3)A well designed and researched 1,500 to 3,000 cfs screening module in the south Delta could

be added sequentially to increase the diversion capacity using best feasible technology with full assurance that "it has been done before".

4) Any facility should be adaptive to changes in requirements for cleaning, sorting, transport, new organisms, and predation interaction with the facility.

North Delta

Recommendations:

The Team recommended the first stage in the north Delta should be a 1,500 to 3,000 cfs screen module at Hood with a discharge to the North Fork of the Mokelumne River. A well designed and researched 1,500 to 3,000 cfs screening module in the north Delta could be added to sequentially thereby increasing the diversion capacity using standard technology with full assurance that "it has been done before". The focus of the production type research facility at Hood would be to test the following:

- The bypass system to the Sacramento River. (Predation issues, pumps, outlets location and types etc.)
- The screen cleaning and debris management systems
- Upstream passage facilities
- Other testing include trash racks, screening velocities, screen material and orientation.
- Forebay hydraulics and predation

Considerations:

1)For alternative 2 we can provide upstream passage around screens and pumps in alternative 2 using:

- Salmon - ladder
- Delta Smelt - locks
- Striped Bass - locks
- Sturgeon - locks
- American Shad - ladder

What is the risk?

- Staging a facility may not demonstrate the ultimate impacts of the facilities.
- Could stage size of ladder and buckets for locks as you stage amount of diversion.
- May want to construct total passage facilities on any size of diversion.
- May need a bay at exit to ladder
- Capital cost high and unsure of delay impact for many species.

2)Do we know how many salmon and other species pass thru the DCC when its open? If not, should do research now to try to get some numbers.
3)Need to look at historical passage record at RedBluff ladders. May not be applicable for some

species.

4)If we build any size diversion at Hood for alternative 2 need an upstream passage facility.

5)Because of varying river stages will have to sluice the fish over the levee back into the River or use other devices such as false weirs, locks ,etc..

6)Need to know species, how many, and when they will arrive at the base of the pumps in order to design effective upstream passage..

7)Flooding of McCormack Williamson Track in alternative 2 may cause delays in upstream fish migration. (Should be looked at by the diversion effects on fishery populations team.)

8) Need to analyze the pool in front of the screens for predation problems. (The area between trash racks and screens)

9)There is no problem designing a facility that allows for different criteria for various species and periods, such as a .2 and .4 approach velocity to the screens.

10)The staging considerations for alternative 3 are similar to Alternative 2, only simpler (no upstream passage facilities)

11)In alternative 3 may need radial gates (i.e hydraulic controls) downstream of the screens if the pumps are moved to the downstream end of the canal near CCF.

12)The risk is much higher in designing effective screens in the south Delta than the north Delta. (Debris management, salvage, transfer, transport ,
etc.)

13)Moving the intake to upstream to Freeport would encounter the same issues as Hood. Hydraulic conditions would be similar if not better.

Appendix A
Questions addressed at the meeting

- **South Delta** - The "Policy Team" would like to consider the merits of a first step in the south Delta. Such a step might be a first stage of an Alternative 1, or Alternative 2. However, it should not preclude moving to Alternative 3.

- 1) How would we stage the construction of a new south Delta and fish screen complex?
  2) Is it feasible to start constructing a 3,000 to 7,000 cfs fish screen in the south Delta, starting in 1999?
    - Do we know enough about the engineering and biological constraints to start design next year?
    - What is the information we need to build screens (data, research, etc . . .)?
    - How would we maximize flexibility, given that we may expand in the future?
    - How do we minimize stranded costs?

  3) Assume that we start design next year.
    - What is the risk we assume?
    - What do we do to minimize risk?
      Research
      Redundancy
      Staging

  4) Can we build a facility that allows for operations for various species and periods? Can we add the flexibility of operating under a range of hydraulic criteria (such as approach velocities ranging between 0.2 and 0.4 fps)?

North Delta - The "Policy Team" may wish to consider staging construction in the north Delta by starting with a "Hood to Mokelumne River" channel, while deferring a decision on the balance of the project until a later date. The channel should be designed to accommodate both Alternative 2 and Alternative 3 as the final stage.

1) How would we stage the construction of a fish screen complex in the north Delta?
2) How do we minimize the risk to fisheries while staging the fish facilities in the north Delta?
  - Do we know enough about the engineering and biological constraints to minimize the risk?
  - What is the information we need to build screens (data, research, etc . . .)?
  - How would we maximize flexibility, given that we may expand in the future?
  - How do we minimize stranded costs?

Appendix B
Comments on the Minutes

The following comments were submitted by listed team members. Editorial comments were included in the redraft of the minutes.

Jim Spence

Seems unlikely that design and permitting could be completed in 2 to 3 years. Therefore, sentence on 2nd page of"minutes" that initial phase of a joint SWP/CVP screening facility would be completed in 2 to 3 years strikes me as unrealistic.

An advantage of an initial joint salvage research facility at NE corner of Clifton Court (mentioned, but not really discussed) is that during low export periods, the entire combined exports could go through this new state of the art facility.

Dennis Dorratcague

I agree with the minutes that were E-mailed to me except as noted below.

South Delta

Q1 How would we stage the construction of a new south Delta fish screen complex?
I think that the minutes are not quite correct here. The consensus was that an operational screen facility should be built at some even fraction of the full build out. For example, a 2,500 cfs facility could be built so that a second facility built later would provide a 5,000 cfs total or 5 more increments would provide the full 15,000 cfs. This facility would be built with the capability of evaluating its performance and performing other tests.
A full research facility at Tracy would have the disadvantages of not being in the most likely location of the full facility at the north end of Clifton Court Forebay (CCF). In addition, if it is decided later that all future screens should be at CCF, the research screens would be a lost investment. However, I think it is more likely that there will be screens at CCF.
The facility should also be a joint effort between the state and USBR. This would provide training and first hand information to personnel from both agencies. Since they both might have to maintain a joint facility setup the working relationship.
Flexibility - There would be little or no gained flexibility from separate facilities since the screens will most likely be in several V-screen modules which can be closed off. The only flexibility would be in the use of different conveyance facilities in the south delta.

North Delta

For getting fish around the Alternative 2 pump station and screens, I thought the group concluded that a ladder could also be used for striped bass. Why does the McCormack-Williamson Tract

have to be flooded? Can't we just have a conveyance through it?
A major issue that should be investigated is: What effect will this have on the downstream migrants out of the Mokelumne River. In 12) on the forth page of minutes, "...risk is much higher in designing effective screens in the South Delta...", the risk is twofold : 1) operationally it is much more difficult to operate (debris, aquatic plants, etc.); 2) survival of Sacramento River salmonids would be less likely.

Something that was left out was the comments on staging from Alternative 2 to 3 at a later date. To change from Alt. 2 to 3 at a later date the following would have to be done: new pump station (more head is needed), new conveyance, Mokelumne River and other crossings required. Items that could be used by both alternatives are : fish screens, part of conveyance, gate structures at the screens. Items that would be lost are most of the conveyance to the McCormack-Williamson Tract and set back levees below the Tract.

General Comments on Prototype Screen
For the first stage prototype facility, I think that it should be of the size of one of the modules planned for the permanent screening facility. Building a portion of it, testing it, and increasing it in size and retesting is not very cost effective and does not meet the schedule requirements. In addition, it has to meet requirements at its full size, so why not test it at its full size first?

Screen orientation is fixed by simple hydraulics, so the prototype does not have to be adjustable for orientation.

Ken Bates

Most of my comments relate to my preference to combine forces and build the south Delta facilities in one location.

South Delta

There was not a consensus whether to build one or two facilities ultimately in the south Delta. Members of the advisory panel suggested combining efforts sooner rather than later for benefits and efficiencies of a more coordinated approach. I assume think there would be a political advantage in recommending joint facilities for the sake of efficiencies.

Rather than a "research screening facility" the initial facility should be a "prototype screening facility with design and operational flexibilities for a thorough evaluation of components that would lead to more efficient designs in the south Delta."

It would be a mistake to end up with a duplication of facilities in the south Delta only because there is not now a thorough discussion to

combine facilities and efforts. The USBR intention to improve facilities at Tracy seem to depend on their liability of operating the existing facility. If there is benefit in combining facilities, ways to reduce their liability, such as credit for participation in any new facility in the south Delta, should be explored.

Regarding considerations, redundancies could be built into a single site as easily as dual sites. Though construction by year 2000 was considered an advantage, I doubt the USBR could be ready for operation in 2000. Don't proceed with the hope of year 2000 operation without more information. Scheduling issues should be developed more thoroughly for both sites.

The consideration of research being done at one facility includes the efficiencies and coordination gained by working on a single track. From the meeting it was apparent that USBR and the state are not moving down a single track to jointly solve fish passage issues in the south Delta.

North Delta
Under the considerations, the size of the ladder and lock buckets would not be staged with the size of the diversion. Certain components such as amount of attraction flow might be staged but not the facilities themselves.

Last risk bullet should refer to upstream passage delay.

I don't see that it would be useful to know the numbers of salmon or other species that cross through the DCC when it is open. It is not clear that this question relates to upstream or downstream passage. Either way, the number that pass through now is not relevant to future numbers. Future numbers will not likely drive the sizing or design criteria of facilities.

Marcin Whitman

South Delta

1) For me (and I believe several others in the group) the usefulness of a Tracy test facility hinged on how quickly it could be come operational compared to the design, construction and operation of the first unit of the new intake facility at the north end of CCF. I do not believe this point is adequately characterized by the minutes.

2) The first unit (prototype) facility we talked about at CCF was sized at 1000-3000 cfs with the ability to replicate these units (as modified in accordance with the lessons learned by the operation of the prototype unit) to accommodate the ultimate sized required by the final alternative. Any buildout over 5,000 cfs has the potential to be stranded cost under Alternative 3. Indeed, given the difficulties this tech team saw with this site and the reconnaissance level of the Phase II report, the ultimate solution might require a facility substantially less than 5,000 cfs in size. The group also emphasized that this prototype have the flexibility to address the issues you listed under the Tracy paragraph. It seems this flexibility would still be needed , even with the Tracy facility because there would be no definitive answers by the time of design and construction. Again this points to the critical timing of the information coming out of the Tracy facility. My understanding of the meeting was that we are being asked how we could expedite CALFED alternatives without excessive stranded costs. This is why the group (with the exception of the USBR) focused on a staged approach at this location as most expeditious and effective.

Richard Wantuck **(Comments are in Bold)**

South Delta

If the CALFED decision is to maintain two diversions in the south Delta (Tracy and north end of CCF), the follow staging is recommended.

1) Construct by the year 2,000 a research screening facility at Tracy that can eventually become a production facility. The facility would consist of a 1,500 to 3,000 cfs module "V" type screen that could be replicated in the south Delta. Use this facility to conduct research on components and programs that would lead more efficient designs in the south Delta (such as trash racks, screening velocities, bypasses, screen material and orientation, fish handling and sorting, debris management, cleaning, transportation, etc.)

Also *Excessive* Predation (and man-made predatory opportunities in and around fish screening and handling facilities) is a very significant problem to be addressed.

2)Start the planning, permitting and design process for a 5,000 to 7,000 cfs screening production screening facility (with capability for research and modification) at north end of CCF. It is anticipated that construction would not start for two to three years and the design would consider the research information from the facility at Tracy. Both facilities would be designed for 0.2 fps approach velocity with capability to increase to 0.4 fps at certain periods.

In order to do this successfully, we'll need to improve our real-time monitoring of fish movements in the Delta. In other words, can we accurately determine where and when a weak swimming species such as delta smelt exists in the diversion area and adjust pumping rates on a real time basis ?

3)Start the planning and the design of the SWP/CVP intertie.

If the CALFED decision is to construct a joint SWP/CVP screening facility at the north end of CCF, the follow staging is recommended.
1)Start the planning, permitting and design process for a first stage 5,000 to 7,000 cfs joint SWP/CVP screening research and production screening facility at north end of CCF. Design the facility in modules for research and production, with capability to be expanded to 15,000 cfs in the future. It is anticipated that the initial stage would be completed in two to three years. Design for a 0.2 fps approach velocity with capability to increase to 0.4 fps at certain periods.

I recall smaller screen module volumes being recommended by the group- in the 3000-5000 cfs range.

2)Start the planning and the design of the SWP/CVP intertie.

Considerations:

1)Advantages of Separate and Joint Facilities **(at build out)**

Separate Facilities
- Flexibility (may have biological and quality advantage especially without barriers)
- Redundancy of system
- USBR has been mandated to fix their screens
- USBR can start immediately and may have constructed by 2000

The 1992 CVPIA mandates that USBR must "...develop and implement a program to mitigate for fishery impacts associated with operations of the Tracy Pumping Plant. Such a program shall include, *but is not limited to* improvement of the existing screens and fish recovery facilities and practices associated the Tracy Pumping Plant..." Title XXXIV-Central Valley Project Improvement Act, Section 3406(b)(4)

Also, USBR operates under terms and conditions set forth by Biological Opinions (B.O.) under the Endangered Species Act. In concept, these B.O.'s could be modified to allow Reclamation mitigation credit at Tracy in return for substantive participation in a CALFED fisheries research and develop program (leading to a long term Delta solution).

Likewise, the language of the CVPIA directs the USBR to improve operations at Tracy from a fisheries standpoint- but it does not set improvement goals, nor does it bind the Bureau to improve the Tracy facility in a way which is incompatible or uncomplimentary to the ultimate, comprehensive Delta fisheries protection plan.

Thus, the long term solution may not necessarily involve the Tracy site as a primary production facility, but interim improvements and supporting research may be viable contributions that satisfy statutory requirements while at the same time aligning Reclamation's efforts with CALFED's initiatives.

Joint Salvage Facility

- Economies of scale
  - -Capital cost
  - -Operations cost
- One joint salvage and research facility
- Research done at one joint facility
- Little or no potential stranded cost (capital and O&M)

The interest in consolidating Delta operations in a single facility is valid, but caution must be taken so that operational flexibility, quality fisheries protection, and adaptive management are not sacrificed in the name of simplification, unification, or ill-advised cost saving measures. In other words, we want the facility or facilities to work, and work well. Whatever is necessary to achieve that goal must be seriously considered.

2)Need modeling studies to determine impacts on water stages of pumping 10,000 to 15,000 cfs continuously even with barriers. **Yes.**

3)A well designed and researched 1,500 to 3,000 cfs screening module in the south Delta could be added sequentially to increase the diversion using best feasible technology with full assurance that "it has been done before". **Yes**

4) Any facility should be adaptive by changes in requirement for cleaning, sorting, transport, new organism, and predation interaction with the facility.

North Delta

The Team recommended the first stage in the north Delta should be a 1,500 to 3,000 cfs screen module at hood with a discharge to the North Fork of the Mokelumne River. A well designed and researched 1,500 to 3,000 cfs screening module in the north Delta could be added sequentially to increase the diversion capacity using standard technology with full assurance that "it has been done before". **[Caution: while facilities this large have been "done before"- each site is**

unique and must be thoroughly investigated. For large diversions, the design process must be supported by directed laboratory research and/or field studies. This methodical approach requires a commitment of adequate time and resources.]
The focus of the production type research facility at Hood would be to test the following:

- The bypass system to the Sacramento River. (Pumps, outlets location and types etc.)
- The screen cleaning and debris management systems
- Upstream passage facilities
- Other testing include trash racks, screening velocities, screen material and orientation.

Considerations:

1)For alternative 2 we can provide upstream passage around screens and pumps in alternative 2 using:

- Salmon - ladder
- Delta Smelt - locks
- Striped Bass - locks
- Sturgeon - locks
- American Shad - ladder

What is the risk?

- Staging a facility may not demonstrate the ultimate impacts of the facilities.
- Could stage size of ladder and buckets for locks as you stage amount of diversion.
- May want to construct total passage facilities on any size of diversion.
- May need a bay at exit to ladder
- Capital cost high and unsure of delay impact for many species.

Alternative 2 entails a much higher level of fish passage complexity. It is not advised.

2)Do we know how many salmon and other species pass thru the DCC when its open? If not, should do research now to try to get some numbers.

3)Do we know how many salmon and other species pass thru the DCC when its open? If not, should do research now to try to get some numbers. **Agree**

4)Need to look at historical on RedBluff ladders. May not be applicable for some species.

5)If we build any size diversion at Hood for alternative 2 need an upstream passage facility. **Such an upstream passage facility (alternative 2) would be complex and costly compared to an isolated conveyance.**

6)Because of varying river stages will have to sluice the fish over the levee back into the River or use other devices such as false weirs, locks ,etc..

7)Need to know species, how many, and when they will arrive at the base of the pumps in order to design effective upstream passage.. **Yes**

8)Flooding of McCormack Williamson Track in alternative 2 may cause delays in upstream fish migration. (Should be looked at by the diversion effects on fishery populations team.)

9) Need to analyze the pool in front of the screens for predation problems. (The area between trash racks and screens)
Research is needed in this area-both in the laboratory and in the field

10)There is no problem designing a facility that allows for criteria for various species and periods. Such as a .2 and .4 approach velocity to the screens.
I would not go so far as to so it's no problem, but it can be done. The key will be to design the facility for the most restrictive flow conditions and species requirements, then operate the pumps accordingly. In the end, however, policy-makers will have to decide *what is the standard of protection* - because it gets much more costly as you approach a protection standard of 100%

12)The staging considerations for alternative 3 are similar to Alternative 2, only simpler (no upstream passage facilities)
Alternative 3 is much cleaner than alternative 2 from a design standpoint.

13)In alternative 3 may need radial gates (i.e hydraulic controls) downstream of the screens since the pumps may be moved to the downstream end of the canal near CCF.

15)The risk is much higher in designing effective screens in the south Delta than the north Delta. (Debris management, salvage, etc.) **Yes, south Delta design issues appear to be more complex and numerous.**

16)Moving the intake to upstream to Freeport would encounter the same issues as Hood. Hydraulic conditions would be similar if not better.

Questions addressed at the meeting:

- **South Delta** - The "Policy Team" would like to consider the merits of a first step in the south Delta. Such a step might be a first stage of an Alternative 1, or Alternative 2. However, it should not preclude moving to Alternative 3.

  1) How would we stage the construction of a new south Delta and fish screen complex?

  2) Is it feasible to start constructing a 3,000 to 7,000 cfs fish screen in the south Delta, starting in 1999?

- Do we know enough about the engineering and biological constraints to start design next year? **We could start the design process, but we'll need to also begin the background and supporting studies in parallel.**

- What is the information we need to build screens (data, research, etc . . .)?
  USBR's Tracy proposal is a good listing of the generic issues at hand. Site-specific studies will be neccessary once a fixed site(s) is chosen
- How would we maximize flexibility, given that we may expand in the future?

- How do we minimize stranded costs?

3) Assume that we start design next year.

- What is the risk we assume?

- What do we do to minimize risk?

  Research - **ideally, perform laboratory research (USBR Denver Hydraulics Lab and UC Davis Hydraulics Lab) in parallel with field research at Tracy and (perhaps) Red Bluff.**

  Redundancy- **need to distinguish between site redundancy and site-specific redundancy using a modular approach**

  Staging-

4) Can we build a facility that allows for operations for various species and periods? Can we add the flexibility of operating under a range of hydraulic criteria (such as approach velocities ranging between 0.2 and 0.4 fps)?
The facility can be built, but the information gathering network must be excellent to make it work, i.e-.- ability to coordinate fish movement, hydrology, CVP operations, tidal influences, etc. on a real time basis.

North Delta - The "Policy Team" may wish to consider staging construction in the north Delta by starting with a "Hood to Mokelumne River" channel, while deferring a decision on the balance of the project until a later date. The channel should be designed to accommodate both Alternative 2 and Alternative 3 as the final stage.

1) How would we stage the construction of a fish screen complex in the north Delta?
At this time, the technical team appears to favor a series of Vee-screen modules, each with a capacity somewhere in the range 3000-5000cfs

2) How do we minimize the risk to fisheries while staging the fish facilities in the north Delta?

- Do we know enough about the engineering and biological constraints to minimize the risk?

The old carpenter's axiom: "measure twice, cut once..." applies here. Intense engineering and biological analysis is required. Issues will begin to take shape as the project progresses, but more information will be required.

- What is the information we need to build screens (data, research, etc . . .)?

- How would we maximize flexibility, given that we may expand in the future?

Some improvements to increase operational flexibility will be possible through fish facility design; but additional downstream storage, demand-side management, and integration of real-time management information will lessen the burden on fish facilities to perform miracles.

In other words, we need to be able to reduce current pumping rates during critical migration periods, particularly when severe drought conditions exist. The only way to realize this is through:

1) reduced export water demand , or

2) increased storage capacity with controlled pumping.

- How do we minimize stranded costs?

1. **Proper prior planning**
2. **Stakeholder buy-in**
3. **Modular design principles**
4. **Structural and operational versatility**